B Central bank digital currency and global currencies

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The Report on the digital euro set out several scenarios in which the need to issue a digital euro may become important.[83] *For example, in the event that the use of cash in the euro area declined significantly, in order to provide access to central bank money in an increasingly digital economy, or if foreign digital money were to largely displace existing domestic currency means of payment. Fostering the international role of the euro is not a prime motivation for issuing a digital euro. However, if the use of a digital euro in cross-border payments were allowed – a decision that remains to be taken – this would also have implications for the international role of the euro.*

Against this background, this special feature examines how issuance of a central bank digital currency (CBDC) could impact the international role of currencies. It stresses that the global appeal of currencies depends on fundamental economic forces which digitisation is unlikely to alter. However, features specific to digital means of payment, including safety, low transaction costs and bundling effects, could ease international adoption of a currency. These features may combine to create positive feedback loops in the use of a currency as a means of payment and as a store of value and have effects on its global appeal. Moreover, the specific design features of a CBDC would be important for its global outreach and ultimately the international role of the currency in which it is denominated. Design features could influence the ability and incentives of non-residents to use the CBDC as a means of payment, unit of account and/or store of value. The special feature presents model simulations by ECB staff using a new structural macroeconomic model, which allows the effect of the different economic mechanisms at play to be quantified. The simulations suggest that a CBDC supports the use of a currency in cross-border payments but is not necessarily a game changer. As noted already, fundamental forces, such as the stability of economic fundamentals and size, remain the most important factors for international currency status.

Why a CBDC matters for international currency status

The global appeal of a currency depends on fundamental economic forces, which digitalisation is unlikely to alter. Such determinants include, for instance, the size of the issuing economy in terms of global trade and finance, the soundness of economic policies, financial market depth and liquidity, and inertia in international currency use.[84]

However, features specific to digital means of payment could ease international adoption of a CBDC. One such feature is safety, as a CBDC would be a claim on the balance sheet of the central bank of issue. This might increase both its appeal for domestic users and its attractiveness for retail trade transactions across borders and

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83 See ECB, *Report on the digital euro*, October 2020.

84 For an overview of these determinants, see Eichengreen, B., Mehl, A. and Chitu, L., *How global currencies work*, Princeton University Press, 2017; see IMF, "Digital money across borders: macro-financial implications", *IMF Policy Paper,* No 2020/050, 2020 for an examination of their relevance in a digital world.

as a store of value, i.e. the CBDC units held for future payments, such as in a digital wallet. Safety helps to mitigate the risks associated with traditional forms of payment for cross-border transactions in goods and services, which involve, for instance, counterparty risk in correspondent banking relationships.[85] Low transaction costs are another feature. A CBDC would have the potential to widen access to payment services, promote financial inclusion and lower mark-ups of traditional intermediaries. If made interoperable with non-domestic payment systems, it could contribute to filling gaps or correcting inefficiencies in cross-currency payment infrastructures, including for transfers of remittances. Lastly, programmability and bundling effects are other features specific to many digital means of payment. Bundling effects are related to the fact that they can be bundled with complementary services, giving rise to economies of scope and convenience benefits. For example, it has been suggested that a CBDC could facilitate the digitalisation of information exchanges in payments through e-invoices, e-receipts, e-identity and e-signature, allowing intermediaries to offer services with higher value added and technological content at lower cost.[86] It could also benefit end-users by giving rise to products that would compete with those offered by big tech firms.

These specific features may combine to amplify positive feedback loops in the use of a CBDC as a means of payment and as a store of value. Recent research suggests that a currency's role as an invoicing or payment unit acts as a complement to its role as a store of value, resulting in positive feedback loops.[87] For instance, a large share of internationally traded goods is invoiced in US dollars and, therefore, demand for US dollar-deposits is also strong.[88] Since global demand for safe US dollar-denominated claims is strong, firms have an incentive to borrow in US dollars. In turn, this encourages firms to continue to invoice trade in that currency, because doing so increases certainty about their future revenues in US dollars, which can be used to pay back debts. A CBDC could affect this feedback loop in two ways. First, low transaction costs and bundling effects could increase its appeal for invoicing cross-border transactions – as a means of payment and as a unit to settle current transactions. In other words, this could increase the pool of retail trade transactions in goods and services that can take place digitally across borders and facilitate an expansion of global e-commerce.[89] Second, the safety of the digital euro could increase its appeal as a store of value and as a unit to settle future claims and transactions (as stressed above, as units held in digital wallets in view of future purchases of goods and services across borders). Complementarities between the

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85 For an overview of standard trade finance instruments and how the global financial crisis of 2007-08 was associated with stress in trade finance markets, see Schmidt-Eisenlohr, T., "Towards a theory of trade finance", *Journal of International Economics*, Vol. 91, 2013, pp. 96-112.

86 "From the payments revolution to the reinvention of money", speech by Fabio Panetta, at the Deutsche Bundesbank conference on the "Future of Payments in Europe", 27 November 2020.

87 See Gopinath, G. and Stein, J., "Banking, trade and the making of a dominant currency", *Quarterly Journal of Economics*, forthcoming.

88 More specifically, given that a dominant share of global trade is invoiced in dollars, demand is strong for financial claims that pay off a guaranteed amount in US dollar terms. This is because, if most imports are priced in dollars – and importantly, if these prices in US dollars are sticky – market participants tend to prefer deposits denominated in US dollars, as they are effectively the safest claim in real terms from their perspective. In other words, while deposits in any currency may be free of default risk, in a world in which exchange rates are variable, only a US dollar deposit held today can be used to purchase a certain quantity of US dollar-invoiced goods tomorrow.

89 In addition, there might also be potential positive spillover effects in business-to-business and wholesale market transactions.

CBDC's role as a payment unit and as a store of value could be significant, and the resulting effect on the global appeal of the currency in which it is denominated would be stronger.

The availability of a CBDC could facilitate currency substitution in third countries with instable currencies and weak fundamentals. It might facilitate digital "dollarisation" in such countries, leading to the full or partial replacement of their currencies with the CBDC for local payments, as a savings vehicle and, ultimately, as the unit of account. This would strengthen the global status of the currency in which the CBDC is denominated but would also reduce monetary policy autonomy in the economies concerned.

Finally, attention should be paid to the risks to stability that might arise if a central bank does not offer a digital currency. One concern could be a situation in which domestic and cross-border payments are dominated by non-domestic providers, including foreign tech giants potentially offering artificial currencies in the future. Not only could this threaten the stability of the financial system, but individuals and merchants alike would be vulnerable to a small number of dominant providers with strong market power,[90] and the ability of central banks to fulfil their monetary policy mandate and role as lender of last resort would be affected. Issuing a CBDC would help to maintain the autonomy of domestic payment systems and the international use of a currency in a digital world.

Implications of alternative design choices for a CBDC

The specific design features of a CBDC would have implications for its global outreach and ultimately the international role of the currency in which it is denominated by influencing the ability and incentives of non-residents to use it as a means of payment, unit of account and/or store of value. These features include: (i) interoperability of the CBDC with non-domestic payment systems, (ii) anonymity of users, (iii) potential restrictions on use by non-residents, (iv) the CBDC's remuneration, and (v) the underlying transfer/settlement mechanism, including modalities for offline payments.

Design choices related to interoperability with non-domestic payment systems are likely to have a significant impact on a CBDC's global outreach.[91] A CBDC could be designed to interoperate and facilitate cross-border and cross-currency payments.[92] In the latter case, the foreign exchange rate leg of the payment transaction is particularly challenging to arrange. Unlike domestic payments, which can be settled in central bank money, it would involve two currencies – the CBDC and another foreign CBDC – which cannot be settled with a common asset, and requires

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90 See Panetta, F. and Bindseil, U., "Digital central bank money for Europeans – getting ready for the future", The ECB Blog, 25 March 2021.

91 Achieving interoperability would reduce risks of currency substitution in third countries insofar as the digital euro could be used for cross-border payments but not necessarily for domestic transactions within another jurisdiction where currencies are unstable. See also "Cross-border payments and CBDC" in "Central bank digital currencies: foundational principles and core features", BIS report, No 1, Bank for International Settlements, 2020.

92 Such cross-currency payment would consist of a transaction where the user pays in CBDC, while the seller receives (and bills the user in) another unit.

an exchange rate to be fixed and sufficient market liquidity. Interoperability would underpin cross-border use and could be designed according to three options:

- One option would be to reduce barriers by enhancing compatibility features between domestic and foreign CBDCs. This would allow diverse CBDCs to coexist with harmonised payment messages, harmonised encryption standards, harmonised regulatory standards (such as harmonised know-your-customer checks and legal entity identifiers) and with overlapping operating times.

- Another option would be to interlink the domestic CBDC with other CBDC systems. This would allow diverse CBDCs to coexist with a shared technological interface or a shared centralised clearing system. Participants in one system could make direct payments in the other system, thereby reducing transaction costs and increasing the transparency of foreign exchange conversion costs.[93]

- A final option consists of integrating CBDC systems in a single payment system. Multiple CBDCs would coexist within a single payment system infrastructure and a single set of rules.[94] One benefit of this option would be to nest the foreign exchange conversion leg of the payment transaction in the payment system and to provide simpler cross-border technical and compliance requirements.

Of the three possible interoperability options, enhancing compatibility features requires the least effort in terms of global cooperation, suggesting that it might be able to be implemented by a relatively larger number of CBDCs. A single payment system would require more significant global cooperation efforts and is perhaps feasible for a smaller number of CBDCs.

Trade-offs between the benefits and costs of anonymity would have further implications for the global outreach of the currency in which a CBDC is denominated. Anonymity would bring benefits to users who value privacy and consumer protection. It would help to save on the costs of obtaining the identities of users through potential third-party infrastructure providers, such as internet providers. If anonymity were embedded in a security token (for instance, a smart card), this would make the use of a CBDC closer to that of a traditional banknote. In turn, anonymity might help increase the attractiveness of the CBDC to non-residents. Taking the euro as an example, a large share of euro banknotes – which are an anonymous means of payment – circulate outside the euro area. On the other hand, anonymity would prevent the identity of users being verified, thereby preventing its use being restricted for legitimate policy objectives.[95] For instance, anonymity would have to be balanced against the need to restrict cross-border flows to prevent large and

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93 One example is Project Stella, a joint research project launched in December 2016 by the ECB and the Bank of Japan to explore the potential of distributed ledger technologies (DLT) for financial market infrastructures, which considered cross-border payments in its progress report of June 2019.

94 One example is the Inthanon-Lionrock project launched by the Hong Kong Monetary Authority and the Bank of Thailand in 2018. This project explores a digital ledger technology solution for cross-border fund transfers. It relies on a cross-border corridor network, where transfers of funds can occur instantaneously on a peer-to-peer basis. The design allows foreign exchange price discovery on the corridor network that enables on-demand foreign exchange conversion; foreign exchange settlement takes place in an atomic payment-versus-payment manner. Regulatory monitoring and compliance are put in place where feasible (see the progress report on this project).

95 For a related discussion, see the *Report on the digital euro*.

volatile investment flows into the CBDC or to build safeguards against its misuse for the financing of terrorism, money laundering and other cross-border criminal activities by (non-)residents. Transparency or selective privacy would enable better compliance and know-your-customer checks to be implemented, thereby controlling illicit payment flows, for instance for large transactions. These safeguards would strengthen the reputation and credibility of the digital euro.

Restrictions would weigh on the global attractiveness of a CBDC. Introducing restrictions could help combat illicit payment flows and reduce the use of the CBDC as an investment vehicle, especially for large-value transactions. Restrictions are easier to implement if bank accounts are used to transact in digital currencies (see below). Alternatively, limits to individual holdings could be introduced through direct quantitative constraints, in other words by putting a ceiling on the amount of a CBDC that non-residents could use.[96] Information would possibly need to be acquired and verified before confirming payment with the CBDC to enforce the limits. However, restricting the access of non-residents to the CBDC would reduce its convenience for cross-border payments, if it were not interoperable with foreign payment systems. This would affect remittances and would not be in line with the G20's objective to enhance cross-border payments. Limits on large-value transfer should apply not only for individual transactions but also for the value transacted over a certain period to prevent them being circumvented through the use of repeated, smaller-value transfers.

The global appeal of a CBDC would likely depend on its remuneration. Remuneration can be used to incentivise or disincentivise use of the CBDC as a store of value and indirectly also as a means of payment by domestic or foreign users (if they were allowed to use the CBDC). Non-residents could potentially find the CBDC particularly attractive as a store of value, leading to capital inflows and excessive upward pressure on the exchange rate. A design choice that aims to incentivise users to use the CBDC as a means of payment, and not as a form of investment that competes with other financial instruments, would introduce a tiered remuneration system in which the remuneration rate on CBDC holdings in excess of a given threshold would be set at unattractive levels.[97] Whether this would significantly reduce the attractiveness of the CBDC as a global store of value would depend on the price elasticity of demand from non-residents. In an extreme scenario that is typical of stressed financial conditions, where such demand is price-inelastic, the disincentive effects of a tiering system on decisions by non-residents as to whether to hold the CBDC might be lessened.[98]

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96 As indicated in the *Report on a digital euro*, ceilings on the amounts or values for cross-border flows would be limited to digital euro and would therefore not prevent non-euro area citizens from using other forms of the currency. This is consistent with the fundamental freedom of movement of capital, which is embedded as a core principle of the euro area.

97 See Bindseil, U. and Panetta, F., "Central bank digital currency remuneration in a world with low or negative nominal interest rates", *VoxEU*, October 2020.

98 For instance, if non-residents had an exceedingly strong preference for the safety of the CBDC, just as some investors have a strong preference for highly rated sovereign bonds despite negative yields.

Whether a CBDC would be designed as a bearer instrument or as an account-based instrument might also have an impact on the international attractiveness of the currency in which it is denominated.[99]

- A bearer CBDC (also referred to as a token-based or value-based CBDC) would reduce the need to use third-party infrastructure (such as internet providers in the case of offline use), would be compatible with full anonymity and easy to scale. These features could combine to increase the global attractiveness of the CBDC. A bearer CBDC would also be well-suited to providing offline payments, which would increase its convenience as a means of payment and presumably increase its attractiveness to non-residents. By contrast, as indicated in the ECB's Report on a digital euro, a bearer CBDC that was designed to be fully anonymous would be less well-suited for introducing effective holdings and/or transaction limits, since the identity of users would be unknown – as they are for banknotes. This could undermine the fight against illicit payment flows to the detriment of the reputation and credibility of the CBDC.

- By contrast, an account-based CBDC would make it easier to restrict access to non-residents who intend to use it for illicit payment flows. However, this might reduce its attractiveness to non-residents compared with a bearer CBDC if, for instance, it meant that there were no possibilities to make offline payments.

[99] It should be noted that the two instruments are not mutually exclusive and may co-exist.